Johansen could never have done this long series of drawings without loving Greenland and its birds. With an eye for color and color-contrasts, and with great skill in laying down paint and keeping it fresh, he made these pictures *in Greenland*. As a group, I like them. But comparing them with "average" bird illustrations would be silly. They were not made as charts of birds, *i.e.*, detailed studies on which descriptions could be based. They are not bird portraits in any ordinary sense of the phrase. They are Greenland, seen by a lover of birds through Greenland air.—George Miksch Sutton.

PREDATOR CONTROL IN THE LIGHT OF RECENT WILDLIFE MANAGEMENT CONCEPTS

Control of predators, both avian and mammalian, has long been predicated on the hypothesis that a "good" predator was a dead predator and that each one killed meant the certain survival of additional numbers of the prey species for the everlasting enjoyment of the naturalist or the increased bag of the hunter. This belief dominates the thinking of many—both administrators and ornithologists—and controls the aetion policy of many state and federal agencies.

Let us examine three specific cases in point:

American mergansers gather in winter on waters providing the best fishing for them, and sometimes these are the best waters for man's fishing as well. Hence, thousands are to be found on the reservoirs of the arid Southwest. Their fish-eating activities on these bodies of water, especially Elephant Butte Reservoir in New Mexico, have caused the state department of eonservation to secure federal permits to kill them by the thousands with shot guns fired from motor boats. This legalized slaughter of a species protected elsewhere as game has been justified by brief, unpublished studies of merganser food habits, which leave some doubt as to how conclusive are the data concerning the proportion of game fishes being taken, the ages of these fishes, and the significance of their numbers. With overwhelming evidence accruing on every side showing that most impoundments are teeming with slow-growing, stunted fishes resulting from overcrowding with fish too small to be catchable, the significance of fishes taken by such predators as mergansers, herons, and pelicans is completely changed. Perhaps the productivity of many waters would profit in actual pounds of catchable fish if significant predation on the lower age-classes could be induced. Evidenee for this has been shown by George Bennett of the Illinois Natural History Survey (*Trans. 12th. North Amer. Wildl. Conf.*, pp. 276–285). He points out that Reelfoot Lake which has taken from it over 400,000 pounds of fish per year by birds alone also provides an average daily take per fisherman of five pounds, a yield exceeded by few, if any, other lakes in this country.

Perhaps in the future we may learn that to manage for an increase of fish-eating birds by attracting nesting colonies is also the best fish management.

It should further be pointed out that the merganser slaughter on Elephant Butte Reservoir has not accomplished any noticeable reduction in the number of mergansers found there. This means that more birds must be moving in and replacing the thousands killed. It then seems very doubtful that the control is accomplishing the claimed reduction in the numbers of fish eaten. Futhermore, what is the effect on the merganser population of the flyway? Is this lake, teeming with fish, to serve as a permanently baited trap to eliminate mergansers? Or, is this increased harvest more likely to stimulate the reproductive success of the mergansers so that the population may actually increase, or at least keep its present level of numbers?

This suggestion is not just a far-fetched possibility for it has been shown that among many populations of vertebrates the rate of increase following a breeding season is greatest when the species is in a low and that this rate of increase falls off in years when the species is in a high, or has an abundant spring breeding population. For a thorough review of the evidence concerning this concept of *inversity* see Errington (*Quart. Rev. Biol.*, 21:144–177, 221–245).

If some of the mergansers slaughtered could be put to some biological use, perhaps we would know the minimum age of breeding in this species, the percentage of juveniles in the population, and be able to compute their reproductive rates and, therefore, be in a better position to judge the effects of control measures. Techniques for these investigations have been worked out by game researchers and stand ready to be applied. We only wish to point out here that the supposed functions and the actual results of merganser control are unknown. Must we go on condoning action programs with such a dubious basis?

Another possible example of the functioning of inversity induced by man's control measures is the tremendous and persistent upsurge in coyotes as witnessed by their spread into hundreds of miles of new range. Not only has the taxpayer's money, wasted by this policy, proven ineffectual over the last 150 years in the United States, but also one wonders whether the upsurge in coyote populations may not have been induced in part by the harvest! We do not wish to imply that the causal relationships are either clear or simple for it is apparent that the same control efforts have almost completely eliminated the coyote's cousin, the timber wolf, as well as driven the mountain lion from much of its former range.

But now the specter of airplane-distributed new poisons, such as "1080," looms on the horizon for all predators and this latest blasphemy against nature provides the means for wiping out the coyote on the Great Plains. Are we again to see plagues of jackrabbits overrunning our cattle ranges as they did in the 1920's? Already early reports of jackrabbit increases in the Dakotas and elsewhere suggest that the shift is on the way. We may face a rabbit-controlled landscape such as England has experienced as a result of extreme predator control on her East Anglican heaths. Are we again to trade one problem species for another, and in the name of a "conservation action program"?

Recent studies by Lyle Sowls, at the Delta Waterfowl Research Station in Manitoba, have demonstrated the significance of renesting, primarily second nesting attempts made by ducks. Prior to this, Cartright (*Trans. 9th North Amer. Wildl. Conf.*, pp. 324–330) clearly explained how important predation on early nests was to actual species survival in upland game birds. He reasoned that if such single-brooded species nested unmolested by predators, a synchronized early nesting would result; this would make the production of the entire year vulnerable to complete destruction by severe late spring weather such as sleet, hail or flooding. In short, the best insurance against such a catastrophe is a prolonged and staggered nesting season *forced by destruction of a goodly proportion of first nests by predators.* Cartright has recently cited similar evidence from waterfowl populations (*Trans. 17th North Amer. Wildl. Conf.*). In the light of this new concept, the wisdom of mass bombings of crows in winter roosts is seriously challenged as a means for bettering duck nesting. Several state game departments in the Middle West have long pointed with pride to their organized slaughter of crows accomplished by night bombing in winter roosts and by shooting contests. But how many states can demonstrate that the crows they kill come from duck-nesting regions or otherwise are detrimental? Again we are having action programs of destruction thrust upon us by state agencies. It is time to

test the need for these actions since the predators eliminated may actually insure a higher average productivity in ducks or upland game.

In some outstanding waterfowl areas we have visited, crows are now comparatively scarce but skunks seem to have reached an all time high. Instead of being continuously classified and treated as vermin perhaps we may learn that this four-footed nest robber has only replaced in function his avian counterpart, the crow, in ensuring a staggered nesting season. In this way a crop of young ducks is never completely vulnerable to destruction by spring climatic catastrophies, such as the hail storms Alberta suffered in 1947 or the floods so destructive to duck nesting in Manitoba the same year.

Now that we have been provided with the concept of inversity as a widely operating population phenomenon, as well as some new angles of the predation equation, it becomes increasingly clear that the old dichotomy of "harmful" and "beneficial" is a meaningless and fallacious classification of living things. This division of all plant and animal species into two exclusive categories supposedly having an economic basis is deeply rooted in many fields of biology. That it is still used by authors of student texts, in botany, in entomology, in Farmers' Bulletins, etc., seems most deplorable. Unless we insist upon the forcible excision of this relic of past thinking from all our biological books, we will continue to raise generations which classify living things only on an economic standard.

This may be disastrous. At the rate our human population is expanding in the United States and the resulting increased rate of demand for room for public developments (now taking one-fifth of all our acreage) naturalists will be in no position to justify the preservation of any species or any area on an economic basis alone. If we are to have and to enjoy birds and to harvest wildlife on a permanent basis, we must provide the next generation with criteria other than monetary for judging the recreational, educational and esthetic value of landscape and wildlife.—William H. Elder and Charles M. Kirkpatrick.

Second Cooperative Study of Nocturnal Bird Migration

Studies of the nocturnal migration of birds, using small telescopes directed at the moon, are being continued this fall on a greatly expanded basis. Interested persons who have access to a small telescope are urged to write at once to Robert J. Newman at the Museum of Zoology, Louisiana State University, Baton Rouge, Louisiana. Details regarding project and procedure will be promptly supplied.—George H. Lowery, Jr.

This number of *The Wilson Bulletin* was published on June 16, 1952.